Chapter Chatter

Dennis Lewis, Associate Editor

Thank you to everyone who attended the 2019 IEEE EMC+SIPI Symposium in New Orleans! Here is some of the feedback I've received…appreciated the wide variety of papers and topics presented, thumbs up to the brass band, hurricanes, and plentiful food during the Welcome Reception (favorites included jambalaya, shrimp creole, and beignets), learned a lot about rocket engine-testing on the trip to the NASA Stennis Space Center, and really enjoyed NOLA (that's "New Orleans Louisiana" for the un-indoctrinated) hospitality and local flavor! Thank you and congratulations to all our committee members and volunteers who made the week a success! Looking ahead, plan to attend the 2020 Symposium in Reno next July!

Germany

On July 17-18, 2019, this year's Ph.D. student meeting of the IEEE German EMC Chapter took place at the Technical University of Dortmund. The work area On-Board Systems (Prof. Stephan Frei) invited all Ph.D. students from the field of EMC in Germany to exchange experiences and get to know each other. A total of 24 doctoral students from Darmstadt, Hamburg, Hanover, Magdeburg, Munich, Siegen, and Stuttgart participated. During the two days, the participants presented their research and discussed some of them intensively. At a barbecue party on the evening of the first day, there was the opportunity to discuss more in-depth scientific questions and to make new contacts or cultivate older ones. A special highlight was the guided tour through the testing laboratories of EMC Test NRW GmbH. Here the participants could see the new absorber chamber and other interesting test facilities of the company as the first group of visitors. The different challenges of practical EMC tests were presented very vividly. The final event was a guided tour through the laboratories of the work area on-board systems. A special thanks goes to Robert Nowak (TU Dortmund) for the excellent organization of this event.

Israel

For many years, the Israeli IEEE EMC Chapter has organized a conference on fundamental and applied EMC topics. This year the 6th Conference on Electromagnetic Compatibility took place on May 23, 2019, in the Shamoon College of Engineering (SCE), Ashdod Campus, Israel, the only academic institute in Israel, which will begin teaching an academic course on EMC this year and later an EMC track including a training laboratory. The conference had more than 200 participants (an increase of 20% relative to the conference held in 2018) and a number of exhibition booths in our professional field.

The conference proved to be a tremendous success in disseminating the up-to-date information, providing an opportunity for meeting colleagues and peers from different organizations and countries, promoting the international and national IEEE and, especially, sharing IEEE EMC Society achievements in fundamental and applied EMC. The conference program and list of abstracts in English were distributed to all participants. We had two invited international keynote speakers: Technical Fellow Electromagnetics, Mr. Dennis Lewis (Boeing Company), and IEEE Life Member, Prof. Michel Ianoz (EFPL, Lausanne University Switzerland). The general assembly keynote lectures were followed by four contributions presented by leading experts in the field of fundamental and applied EMC and generated numerous questions and comments from the audience. After lunch, the attendees divided into four parallel sessions.

Ph.D. students working in the field of EMC met at the Technical University of Dortmund for the EMC German Chapter's annual Ph.D. student meeting on July 17-18.

The Plenary Session of the Israeli IEEE EMC Chapter conference on fundamental and applied EMC topics.

Dr. Irit Juwiler, Head of the Electrical & Electronics Engineering Department, SCE, Ashdod, Israel gave the welcome address at the May 23 conference.

The members of the conference organization committee included Dr. Irit Juwiler, Head of the Electrical & Electronics Engineering Department, SCE Ashdod; Prof. Jacob Gavan, IEEE Fellow, Chairman IEEE EMC Israel Chapter; Mr. Moshe Netzer, SM IEEE, Chairman SEEEI local EMC Chapter. Our Conference was sponsored by IEEE Israel, ELTA, ELBIT, and RAFAEL, which have strong groups of EMC specialists.

The conference general assembly started with a welcome address from the organization committee members about the importance of EMC and IEEE and the goals of the conference followed by the presentation of Mr. Dennis Lewis on "EMC and Aerospace Antenna Measurement Challenges". EMC emissions and immunity measurements require the characterization of antennas at reduced distances. Antenna-to-antenna interactions present during calibration may not be present during measurements and may introduce significant errors. High Intensity Radiated Field (HIRF) measurements require the antennas be characterized in the far-field. Reference measurements must also be taken on-site and require the removal of ground reflections. Time domain techniques can be employed in both of these cases but require antennas with good time domain response. Unique Transverse Electromagnetic (TEM) antennas were developed to allow time domain gating. TEM antennas are simple, inexpensive and well suited for time domain applications due to their low aperture reflections and clean time domain response.

The second invited speaker was Prof. Michel Ianoz with the presentation: "30 years of Activity on HEMP and HPEM Effects". The lecturer presented his contribution and shared his experience gained from 30 years of activity in the field of HEMP and HPEM. His activity began in 1978, when his laboratory of the Swiss Federal Institute of Technology in Lausanne received a study project for a cable, in order to evaluate if the shielded cables they were producing for the Swiss Army were correctly hardened against HEMP. The speaker continued his work in the field of HEMP, with various projects financed by the Swiss Army and the French Electricity Company. He was active in the field of standardization for HEMP and HPEM effects, from 1989 and after his retirement in 2001, until 2008. In parallel, from 2000 to 2014, he gave lectures in this field at Chinese universities and in various countries, including Israel, as a Distinguished EMC Society Lecturer.

The third speaker was Dr. Isahar Gabay, ELTA Systems Ltd. Ashdod, and Prof. Jacob Gavan, who discussed the need to increase the level of EMC Engineers "EMC by Academy". Electromagnetic Compatibility (EMC) is a multidisciplinary branch in Electrical Engineering covering specific subjects of theory and design. It covers a very broad area of knowledge related to many aspects of Electrical Engineering theory: electrical circuits, electronic circuits, electromagnetic fields, RF and microwaves circuits, antennas and propagation, power supplies, cables and mechanical structures. Today, in universities and colleges, only a few of them build a full program of EMC studies with deep correlation between all specific subjects mentioned above. Therefore, the technical EMC courses in the market are oriented to narrow subjects giving useful but limited infor-

Prof. Jacob Gavan, the Israel IEEE EMC Chapter Chair, also gave a welcome address. More than 200 participants attended the conference.

The attendees of the Israeli IEEE EMC Chapter conference were very interested in both fundamental and applied, traditional and emerging, issues of EMC.

Mr. Dennis Lewis, Technical Fellow Electromagnetics with The Boeing Company in Seattle, Washington, USA, was an invited keynote speaker.

Prof. Michel Ianoz (left), invited keynote speaker, EFPL, Lausanne, Switzerland, IEEE Life Member and Dr. Irit Juwiler, member of the conference organization committee.

mation. In addition, the implementation of protection devices against ESD, TVS, EMP and lightning must be strongly based on a deep understanding of all protected hardware. Thus, the only way to increase the level of EMC engineers is to build a professional program in academy, to bring the best lecturers and to provide a strong theory supported with practical training. Signal and Power Integrity (SI) become important parts of EMC because of the complexity of high rate digital signals. In most countries, including the USA, the field of EMC study is usually not a standard requirement in the engineering programs of most universities. This lack of adequate and up to date EMC design and development education at the university level is actually contributing to the erosion of the technical and export capabilities. A comprehensive knowledge in the disciplines of electrical, mechanical, chemical, and computer science are required as a prerequisite base for performing design and certification tasks related to EMC. Dr. Gabay will begin to teach EMC this year in the SCE Ashdod campus.

Mr. Oren Hartal, EMC Design, next presented "Measurement of Facility EMP Shielding". During the construction of an EMP protected facility, there are formal program stages during which the construction contractor must verify that the installed shield performance is as required per MIL-STD 188-125-1 and tested accordingly. The test required by the standard sets magnetic and electric field shielding limits and test procedures according to MIL-STD 285. The test process and frequencies required by the standard results in a procedure which even for a medium sized facility is lengthy and consequently, expensive. Is the full procedure really required to verify the performance of the shielding? When measuring the shielding efficiency of a structure with an envelope shield, the concrete of the structure is part of the shield and at high frequencies has a non-negligible effect, obscuring the capability of identifying flaws in the metal shield when using a single high frequency measurement, so a lower frequency measurement is also required. This paper prepared at the initiative of Army Maj. Shay Rozenberg and his important contributions presented a frugal cost effective approach to the selection of test frequencies and the basis for this approach.

Prof. Jacob Gavan with Dr. Anatoly Tsaliovich discussed the necessity of and practical steps for development of efficient and economical directed energy transmission by microwave technology and laser, as well as protection systems against new kinds of enemy threats at Israel's borders. These topics, while taking into account the already existing high accuracy tactical missile threats, as well as accompanying EMC and health challenges, were reviewed in the presentation, "Addressing Directed Energy Issues and EMC for Electric Power Transmission and Protection from Fire Balloons, Kites, Drones, and Missiles". With the appearance of a new set of low cost terrorist threats – such as fire balloons, explosive kites, and certain classes of drones – the use of common kinetic protection weapons (artillery and rockets) proves economically non-feasible. For this purpose, the directed energy weapons were recently suggested, enabled by the technological achievements in the areas of high power microwave transmitters and lasers, radar, and efficient RECTENNAs. In these fields Israel has been a pioneer (e.g., by participating in the international Nautilus project, now on hold) and developing kinetic systems such as Iron Dome, that were successfully used in several ongoing conflicts. The laser-based weapons seem to be ideal against enemy balloons and kites, since even if to be the most effective they are limited to certain weather conditions, in Israeli climate such conditions are usually prevailing. Besides, the bad weather also prevents an efficient launch of enemy balloons and kites. However, the existing laser systems are not yet at a sufficient technical level to adequately counter traditional "heavy" missiles and projectiles that requires a type of kinetic weapons. Therefore, today the most efficient all-weather solution to the terrorist threats seems to be a future tandem action of combined kinetic and high power laser weapons. At present, the implementation of such weapon systems becomes an urgent necessity! Finally, it should be kept in mind that the use of suggested new weapon systems holds potential for harm to the local nature, infrastructure, and human life. For this reason, during weapon development and implementation, important EMC and health protection measures should be additionally considered.

The last presenter was Dr. Haim Mazar, ITU and World Bank expert, who discussed the "International Activities to Update the International Personnel (HERP) Exposure Limits". Generally, the national HERP legislation uses the international ICNIRP 1998 exposure limits in some way or another to limit the HERP exposure of people. The present ICNIRP Guidelines for limiting exposure and the IEEE standard for safety levels with respect to human exposure are currently

Mr. Moshe Netzer, Chairman of the SEEEI EMC Chapter and member of the conference organization committee, provides a comment during the technical session.

(From left) Mr. Oren Hartal, Consultant, Mr. Uri Vered, Consultant, Prof. Jacob Gavan and Dr. Irit Juwiler in the exhibition hall.

revised. The author serves as the ITU intersector for activities on RF-EMF. He noted that in October 2018 provided on behalf of ITU, 32 comments were received as a response to the ICNIRP public consultation of the draft ICNIRP "Guidelines on Limiting EMF Exposure (100 kHz to 300 GHz)". These International recommendations were briefly referenced.

Following the plenary session, attendees visited the technical exhibits, poster session and enjoyed a buffet lunch. The second part of the conference consisted of four parallel afternoon sessions on fundamental and applied EMC, including five lectures in each session as follows:

A. **Antennas Systems**, with Dr. Irit Juwiler, Head of Electrical & Electronics Engineering Department, SCE Ashdod, as the session chair.

- **Different Methods of Mutual Coupling Reduction in Planar Antennas Arrays** by Vladimir Vulfin, Itamar Madar, Electromagnetics Infinity LTD, ANSYS Certified Channel Partner
- **Wearable Systems and Antennas for Wireless Communication, Medical and IoT Applications** by Albert Sabban, Department of Electrical & Electronics Engineering, ORT Brauda College, Israel
- **Lightning Protection for Antenna Switching Driver** by Yoav Koral, ELBIT ISTAR EMC Group
- **Comparing Directive Antenna Patterns: Regulation and Standards** by Haim Mazar, ITU, Expert
- **Generic Terrain Influenced Model for 30 MHz to 3000 MHz** by Uri Vered, Consultant

B. **EMC Systems**, with Moshe Netzer, former chair of the IEEE EMC Israel Chapter, as the session chair.

- **Electromagnetic Environment Effect (E3)** by Danilo Di Febo, ADCOM
- **A Comparison Between Models used for ELF Magnetic Field Analysis** by Oren Hartal, EMC Design
- **Modular Approval and Permissive Change Regulatory Issues** by Rami Nataf, Lab Manager of EMC & Radio Laboratory, QualiTech
- **Fundamentals of Electromagnetic Compatibility** by F. Jose Arques, Universidad Politecnica de Madrid (Spain)
- **G-d Failed at First, But You Can Succeed to Run Your Project Right the First Time [by Avoiding EMI Problems due to Board Design for Signal and Power Integrity]** by Shlomi Zigdon, iTech-icollege, Herzliya
- **Using a Cellular Phone in a Gas Station – Risk Analysis** by Moshe Netzer, SM IEEE, CEO EMC Engineering and Safety Ltd.

C. **Direct Energy Systems**, with Prof. Arie M. Lavie, Creative Technologies Israel, as the session chair.

- **Protection of Electric Equipment against High Altitude Electromagnetic Pulse** by Vladimir Gurevich, Central Electric Laboratory, Israel Electric Corp., Haifa, Israel
- **Relativistic Force Generator: Coil-Coil & Magnet-Coil Cases** by Prof. Asher Yahalom, Faculty of Engineering, Ariel University
- **EMI Shielding Coating Solutions for Optical Apertures** by Alina Shumiatzky, ELBIT ISTAR EMC Group
- **Active Power Filters for EMI Mitigation** by Y. Mogilevsky, M. Mellincovsky, M. Roitman, Department of Electrical & Electronics Engineering, SCE, Ashdod, Israel
- **Design Parameter for Wireless Power Transmission to Electric Vehicle Systems** by Arie M. Lavie, CTI – Creative Technologies Israel

Prof. Arie M. Lavie could not arrive because

Dr. Gabay Isahar, ELTA Systems Ltd. (far right), Mr. Oren Hartal (second from the left), Consultant, with EMC representatives from the Israeli Air Force.

Shiny Abraham with Seattle University and her student, Michel Mugisha, cheerfully staffed the registration area for the IEEE Seattle Section 5G Workshop on June 26.

The 5G Workshop's keynote speaker, Mr. Chetan Sharma with Chetan Sharma Consulting, presented on the "5G Ecosystem" at the Museum of Flight in Seattle.

Attendees listened intently throughout the day during the many diverse presentations at the IEEE Seattle Section 5G Workshop.

Boeing's Anil Kumar (left) and Dennis Lewis, IEEE Seattle EMC Chapter Chair, enjoyed catching up on wireless activity during the 5G Workshop.

During the lunch break, generously sponsored by Element Materials Technology and Pearson Electronics, attendees had the chance to network and exchange ideas.

Alon Newton (left) with Microsoft, chair of the 5G Workshop organizing committee, presented a certificate of appreciation to speaker Garth D'Abreu with ETS-Lindgren.

Attendees at the 5G Workshop appreciated the opportunity to learn more about 5G products and services from the many exhibitors, including Sharon Smith with In Compliance Magazine.

Speaker Alan Way of Spirent's thought provoking presentation on the "Internet of Threats" generated many questions from the audience at the 5G Workshop.

of illness and was replaced as chair by Prof. Asher Yahalom.

D. **Communication Systems**, with Prof. Yosef Pinhasi, Faculty of Engineering, Ariel University, as the session chair.

- **Power Line Communications: EMC Issues and Standards** by Prof. David Luengo, Universidad Politecnica de Madrid (Spain)

- **Application of the Hollow Straight Waveguide with Dielectric Profile in the Cross Section** by Dr. Zion Menachem, Department of Electrical & Electronics Engineering, SCE, Beer Sheva, Israel

- **Developing EMC Course Labs Using Experimental, Analytical and Numerical Tools** by Dr. Ilya Merhasin, Faculty of Engineering, Tel Aviv university

- **Authentication of Recording Device by the Analysis of Induced Parasitic Electrical Network Frequency (ENF) Signal** by D. Bykhovsky, Department of Electrical & Electronics Engineering, SCE, Beer-Sheva, Israel

- **Interferences to Wireless Links Operating with Constant Envelope Waveforms** by Dorin Cohen, Tomer Zitron and Yosef Pinhasi, Faculty of Engineering, Ariel University

We departed late in the evening after thanking all the organizations and the individuals, which contributed to the success of our conference. We also thanked the attendees for supporting our event. We have received much positive feedback about our conference and in a few months we shall begin to organize the next IEEE EMC Israel 2020 spring conference.

Seattle

Over 80 people attended the IEEE Seattle Section "5G Workshop 2019" on June 26 at the Museum of Flight in Seattle, Washington. The workshop organizers represented the IEEE Seattle Chapters of the Communications, Vehicular Technology, EMC, Broadcast Technology, Information Theory, and Intelligent Transportation Systems Societies. The full-day event began at 8:00 am with a continental breakfast. Following breakfast, Dennis Lewis, EMC Chapter Chair, and Alon Newton, Communications Joint Chapter Chair provided the welcome and opening remarks. Mr. Chetan Sharma with Chetan Sharma Consulting provided the keynote presentation on the "5G Ecosystem." This set the stage for the following presentations by noted industry experts:

- **5G Network Virtualization**, by Mr. Alexey Gorbunov, AT&T
- **5G Technical Advancement Over 4G**, by Mr. Gezim Krasniqi, T-Mobile
- **5G Use Cases**, by Mr. Alejandro Gil, Ericsson
- **Towards a Scalable and Reliable Vehicle-to-Everything (V2X) System**, by Prof. Lin Cai, University of Victoria, Victoria, BC, Canada
- **Connected Vehicles: Performance Verification Impact on the Modern Automotive Industry**, by Mr. Garth D'Abreu, ETS-Lindgren
- **5G Enabled IoT Service RCA**, by Mr. Petri Hautakangas, Tupl
- **5G & IoT or Internet of Threats**, by Mr. Alan Way, Spirent
- **Satellite-Enabled Mobile Platforms in a 5G Architecture**, by Mr. Ben Posthuma, Kymeta

The technical program provided a view of 5G from many different angles. The attendees appreciated the diversity of topics and companies represented on the technical program. During the mid-morning, lunch and mid-afternoon breaks in the technical program, attendees could visit with the many exhibitors and reconnect with colleagues. The lunch buffet featured an excellent display of deli sandwiches catered by McCormick & Schmick's.

The IEEE Seattle Section wishes to thank the exhibitors for supporting the 5G Workshop, including Advanced Test Equipment Rentals, AE Techron, Ametek CTS US, Anritsu, ANSYS, Aviat Networks, ConRes Test Equipment, Element Materials Technology, ETS-Lindgren, HV Technologies, In Compliance Magazine, Pearson Electronics, Raymond EMC, Rohde & Schwarz, Spirent, SteppIR Communication Systems, Teledyne LeCroy, Toyo Corporation, and V Technical Textiles. Special thanks to our Lunch Sponsors: Pearson Electronics and Element Materials Technology.

Southeastern Michigan

In May 2019, Professor Eric Bogatin came to instruct the Southeastern Michigan EMC Fest participants in the finer points of EMC measurement. Professor Bogatin, Dean of the Signal Integrity Academy, specializes in making complex signal integrity topics easy to understand while strengthening engineering intuition. Dr. Bogatin wanted us to understand the physical interaction of the components and anticipate measurement values before taking them, making it obvious when EMC measurements are incorrect.

One of the topics was "Don't Let Ground Bounce Spoil Your Day". Ground bounce is cross talk that is dominated by inductive coupling. Dr. Bogatin said that any structure other than a wide uniform ground plane will cause ground bounce as will two signals sharing a return path. Professor Bogatin suggested using differential signaling to reduce ground bounce when two signals share the same path. Thus, the return currents of the two signals will overlap and cancel out. He suggested avoiding signal paths without continuous return paths, narrow package traces, narrow connector pins, resistor SIPS, plane transitions (return path impedance discontinuities), gaps in planes (return path impedance discontinuities), Vcc to Vss connections (return path impedance), and vias - signals changing layers (return path impedance discontinuities). He urged us to remember that noise margins are getting smaller, and planes have the smallest inductance. Stick with planes - the wider the better!

Professor Bogatin explained how to make valid power rail measurements without destroying a scope in the presentation "Secrets to Successful Power Rail Measurements". He said that we must be aware of the limitations of EMC measurements. He reminded us that PC boards should be designed with built in testing connection points. We need to understand the operation of the oscilloscope to avoid being tricked by measurement anomalies. The scope bandwidth and signal bandwidth is very important. If the signal bandwidth is large - using a probe, such as a 10x probe, with a small bandwidth will be futile - any measurements will not allow us to understand the dynamics of what we are measur-

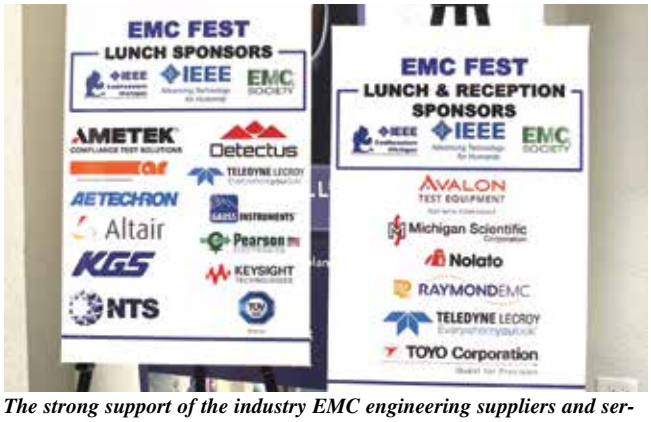
Setup of the audio visual equipment began the evening before the event with Malcolm Lunn placing projectors, screens, microphones, speakers, controls and lots of wiring throughout the EMC Fest meeting room.

Southeastern Michigan EMC Chapter Officers Scott Lytle (Chapter Chair) and Matt Feusse (Chapter Treasurer) man the registration desk as attendees begin to check in for the EMC Fest event.

Professor Eric Bogatin came to instruct the Southeastern Michigan EMC Fest participants of the finer points of EMC measurements.

Total registration for EMC Fest 2019 was 152 technical program engineers and 77 exhibitors for a total of 229 attendees. There was a full house for the meeting room!

Malcolm Lunn (left) relaxes with a friend at lunch during the day. He worked tirelessly behind the scenes to set up all the audio and video (A/V) equipment that made EMC Fest a success.



The strong support of the industry EMC engineering suppliers and service providers, along with their representatives, is one of the primary reasons for the continued yearly success of EMC Fest.

ing. He warned us that large DC offsets limit voltage resolution, RF pick up can swamp rail noise, poor SNR can hide rail noise, low-impedance probe loading can distort rail voltages and that inadequate BW response of a measurement system can hide rail noise. He suggested that active "rail" probes be used which allow for high resolution high bandwidth measurements of signals with DC offset. Soldered-in tips should be used where possible to provide for low RF pick up and highest bandwidth. This provides the lowest loop-inductance tip for the probe measurements!

"Faster Time to Insight Using Real Time Spectral Analysis of Power Rails" was Dr. Bogatin's third subject. Professor Bogatin reintroduced us to the principles of signal filtering, and the figures of merit that are used to describe a signal. He talked about the differences between time domain analysis, frequency domain analysis, and how to get from one to another. Dr. Bogatin explained the basis of FFT analysis of signals now available in oscilloscopes. He reviewed how the analysis is impacted when the measurement does not contain an integral number of waveform periods and how intelligent windowing is used to lessen the impact of this "leakage" error. He covered some of the most popular filtering windows. Professor Bogatin explained why the Blackman-Harris, Von Hann, and Hamming windows reduce leakage.

Transmission lines were Dr. Bogatin's final subject in his presentation, "What Every Scope User Needs to Know about Transmission Lines". He reminded us that every measurement device includes a transmission line and thus a delay and a rise time as well as the possibility for mismatch

EMC engineering companies from all over the world joined us at EMC Fest 2019. Germany was represented above left (Langer EMV-Technik GmbH) and Japan (Kitagawa Industries) in the center photo. Even companies from Michigan, including Michigan Scientific, (above right) were represented!

Some vendors come from neighboring cities, such as Chicago, where their own version of EMC Fest took place just two days before the SE Michigan event. Steve Laya, of Elite Electronics in Chicago, talks with Arnie Neilson (retired) of Ford Motor Company.

The crowd was continuous throughout the day with visitors and vendors engaging in animated discussions at every booth.

Kimball Williams, Scott Lytle, and Candace Suriano were honored for their work in EMC education. Jim Woodyard (left) presented Candace Suriano with her award for Excellence in Service to EMC Education.

Scott Lytle, Southeastern Michigan EMC Chapter Chair, proudly displays the EMC Society award for the 2018 Chapter-of-the-Year. This is a fitting tribute to 20 years of successful EMC Fest events in Southeastern Michigan.

effects. Professor Bogatin told us once again his favorite rule, Rule #9: Never do a measurement or simulation without first anticipating what you expect to see. He said that we must understand that all interconnects are transmission lines, signals propagate with an instantaneous impedance, those signals will reflect with any change of impedance, and that Vth, Rth, RT need to be established in order to predict the measurement values. He explained when an active probe and a passive probe should be used along with the best way to connect them to the scope.

Dr. Bogatin taught us an immense amount about EMC measurements!

The EMC Fest included a vendor display area where participants made many valuable professional contacts. Kimball Williams, Scott Lytle, and Candace Suriano were honored for their work in EMC education. Teledyne LeCroy gave all attending a gift subscription to the Teledyne LeCroy Signal Integrity Academy for three months. The Chapter wishes to thank Malcolm Lunn for his assistance with the audio visual equipment. During all the lectures and presentations, Malcolm constantly monitored all the A/V operations to ensure clear visuals and intelligible audio signals for every attendee.

Many thanks to Professor Bogatin, Teledyne LeCroy, EMC Fest staff, and the many vendors that participated to make this year's EMC Fest another great success!

Taipei

On July 3, 2019, the Taipei EMC Chapter hosted a technical presentation at the

Taipei EMC Chapter Chair Hsi-Tseng Chou (left) introduced IEEE EMC Society Distinguished Lecturer, Dr. Xiaoxiong Gu, to the attendees at the July 3 meeting.

Asst. Prof. Seniha Esen Yuksel, Hacettepe University, presented "Can You "See" the Target in the Shadow?" at the Turkey Joint Chapter meeting on October 19.

National Taiwan University. The presentation, titled "Opportunities, Challenges and Implementations of Silicon Integration and Packaging in mmWave Radar and Communication Applications," was delivered by the IEEE EMC Society Distinguished Lecturer Dr. Xiaoxiong Gu. He received the Ph.D. in electrical engineering from the University of Washington, Seattle, USA, in 2006. He joined IBM Research as a Research Staff Member in January 2007. His research activities are focused on 5G radio access technologies, optoelectronic and mmWave packaging, electrical designs, modeling and characterization of communication, imaging radar and computation systems. He has recently worked on antenna-in-package design and integration for mmWave imaging and communication systems including Ka-band, V-band and W-band phased-array modules. He has also worked on 3D electrical packaging and signal/power integrity analysis for high-speed I/O subsystems including on-chip and off-chip interconnects. He has been involved in developing novel TSV and interposer technologies for heterogeneous system integration.

This presentation emphasized that the co-design and integration of RFIC, package, and antennas are critical to enable multiple aspects of 5G communications (backhaul, last mile, mobile access) and are particularly challenging at mmWave frequencies. It covered various important aspects of mmWave antenna module packaging and integration for base station, backhaul, and user equipment applications, respectively. Dr. Gu first presented a historical perspective on Si-based mmWave modules and approaches for antenna and IC integration including trade-offs. He focused on the challenges, implementation, and characterization of a 28-GHz phased-array module with 64 dual polarized antennas for 5G base station applications. Then, he introduced a software-defined phased array radio based on the 28 GHz hardware. The highly re-configurable phased array radio features beam shaping/steering control as well as data TX/RX function control from a single Python-based software interface. Second, he presented a W-band phased-array module with 64-element dual-polarization antennas for radar imaging and backhaul application. The module consists of a multilayer organic chip-carrier package and a 16-element phased-array TXIC or a 32-element RXIC chipset. Third, he described a compact, low-power, 60 GHz switched-beam transceiver module suitable for handset integration incorporating four antennas that supports both normal and end-fire directions for a wide link spatial coverage. At the end of the presentation, all the attendees participated in the question and answer session. This discussion continued and ended at a campus restaurant in a relaxed and delightful atmosphere.

Turkey

The Turkey Joint AP/MTT/EMC/ED Chapter completed 2018 with nine technical seminars as follows on a variety of topics, including computers, antennas, robotics, photonic crystals, plasmonics, deep learning, and internet of things.

- 19 October 2018
  Speaker: Asst. Prof. Seniha Esen Yuksel, Hacettepe University
  Topic: Can You "See" the Target in the Shadow?

- 26 October 2018
  Speaker: Mehmet Altuntas, Hüzme Savunma
  Topic: Antenna Technologies for Defense Systems

Asst. Prof. Nazlı Íkizler Çinbis, Hacettepe University, presented "Recognition of Human Interactions and Collective Activities" at the Turkey Joint Chapter meeting on November 2.

Asst. Prof. Onur Özcan, Bilkent University, presented "Design, Manufacturing, and Locomotion of Miniature Robots" at the Turkey Joint Chapter meeting on November 9.

Assoc. Prof. Sinan Kalkan, Middle East Technical University, presented "Context in Robots" at the Turkey Joint Chapter meeting on November 23.

Asst. Prof. Serap Aksu, Koç University, presented "Seeing Proteins in the Infrared: Plasmofluidics and Spectroscopy" at the Turkey Joint Chapter meeting on December 7.

Asst. Prof. Sema Dumanlı Oktar, Bogaziçi University, presented "Internet of Health Things (IoHT) and the Healthcare Revolution" at the Turkey Joint Chapter meeting on December 8.

Assoc. Prof. Alptekin Temizel, Middle East Technical University, presented "Deep Learning in Computer Vision" at the Turkey Joint Chapter meeting on December 14.

Being from Finland, Prof. Ari Sihvola did not miss the chance to visit a Turkish hamam while visiting the Turkey Joint Chapter in February.

Asst. Prof. Emre Akbas, Middle East Technical University, presented "Object Detection through Search with a Foveated Visual System" at the Turkey Joint Chapter meeting on March 1.

Prof. Ari Sihvola's (IEEE Antennas and Propagation Society Distinguished Lecturer) February seminars in Turkey attracted great interest, particularly of young engineers and students.

- 2 November 2018
  Speaker: Asst. Prof. Nazlı İkizler Çinbis, Hacettepe University
  Topic: Recognition of Human Interactions and Collective Activities

- 9 November 2018
  Speaker: Asst. Prof. Onur Özcan, Bilkent University
  Topic: Design, Manufacturing, and Locomotion of Miniature Robots

- 16 November 2018
  Speaker: Prof. Hamza Kurt, TOBB-ETÜ
  Topic: Slow Light and Optical Cloaking

- 23 November 2018
  Speaker: Assoc. Prof. Sinan Kalkan, Middle East Technical University
  Topic: Context in Robots

- 7 December 2018
  Speaker: Asst. Prof. Serap Aksu, Koç University
  Topic: Seeing Proteins in the Infrared: Plasmofluidics and Spectroscopy

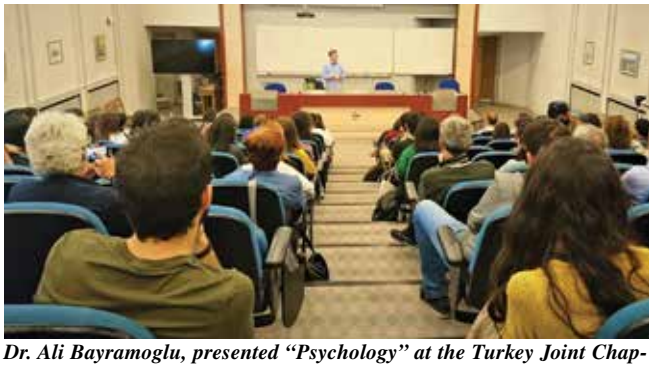
- 14 December 2018
  Speaker: Assoc. Prof. Alptekin Temizel, Middle East Technical University
  Topic: Deep Learning in Computer Vision

- 28 December 2018
  Speaker: Asst. Prof. Sema Dumanlı Oktar, Bogaziçi University
  Topic: Internet of Health Things (IoHT) and the Healthcare Revolution

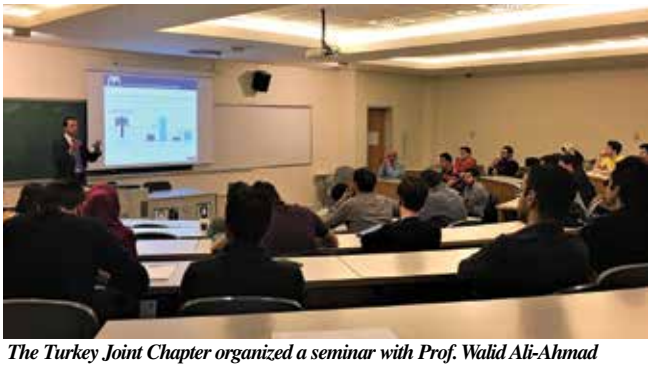
So far, 2019 has been a very active year for the Turkey AP/MTT/EMC/ED Chapter. Three distinguished lecturers have visited Turkey to deliver seminars and to meet with Turkish

Assoc. Prof. Tolga Çukur, Bilkent University, presented "Rapid, Comprehensive, High-Resolution MR Imaging: From Sparse Recovery to Machine Learning" at the Turkey Joint Chapter meeting on March 8.

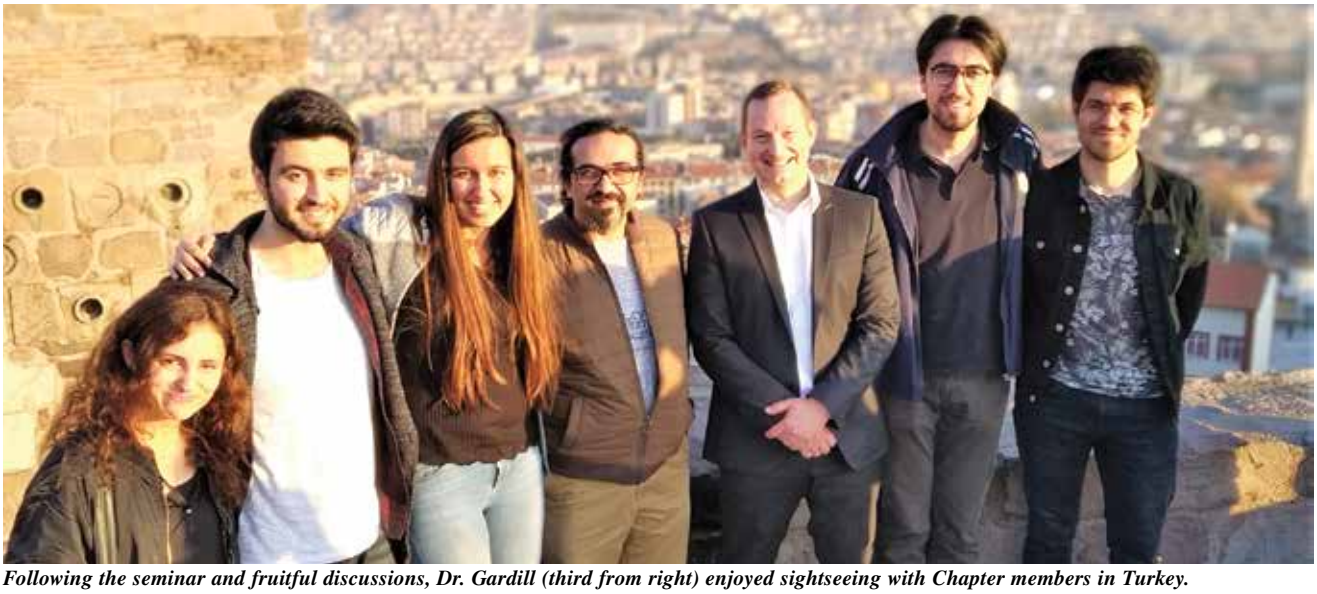
Dr. Markus Gardill (IEEE MTT Society Distinguished Lecturer) presented on March 22 at the Middle East Technical University. The seminar was a great success, attracting considerable attendance from industry.



Dr. Ali Bayramoglu, presented "Psychology" at the Turkey Joint Chapter meeting on April 26.



The Turkey Joint Chapter organized a seminar with Prof. Walid Ali-Ahmad (MTT-S Distinguished Lecturer) on March 27 at Sabancı University in Istanbul.



Following the seminar and fruitful discussions, Dr. Gardill (third from right) enjoyed sightseeing with Chapter members in Turkey.

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researchers. Prof. Ari Sihvola's (IEEE Antennas and Propagation Society Distinguished Lecturer) seminars were on 12 February 2019 at Gebze Technical University and on 15 February 2019 at Middle East Technical University both attracted great interest, particularly of young engineers and students. Being from Finland, Prof. Ari did not miss the chance of visiting a Turkish hamam. Dr. Markus Gardill's (IEEE Microwave Theory and Techniques Society (MTT-S) Distinguished Lecturer) seminar was on 22 March 2019 at Middle East Technical University. The seminar was a great success, attracting considerable attendance from industry. Following the seminar and fruitful discussions, Dr. Gardill enjoyed sightseeing with Chapter members. Finally, the Chapter organized the seminar of Prof. Walid Ali-Ahmad (MTT-S Distinguished Lecturer) on 27 March 2019 at Sabancı University in Istanbul.

In addition to the Distinguished Lecturer seminars, the Turkey AP/MTT/EMC/ED Chapter organized several seminars and talks on a variety of technical and non-technical topics, including research ethics and psychology, as follows:

- 1 March 2019
  Speaker: Asst. Prof. Emre Akbas, Middle East Technical University
  Topic: Object Detection through Search with a Foveated Visual System

- 8 March 2019
  Speaker: Assoc. Prof. Tolga Çukur, Bilkent University
  Topic: Rapid, Comprehensive, High-Resolution MR Imaging: From Sparse Recovery to Machine Learning

- 15 March 2019
  Speaker: Assoc. Prof. Selim Aksoy, Bilkent University
  Topic: Weakly Supervised Learning Algorithms for Medical Imaging and Remote Sensing Applications

- 5 April 2019
  Speaker: Prof. Abdullah Atalar, Bilkent University
  Topic: Research Ethics

- 12 April 2019
  Speaker: Assoc. Prof. Melda Yüksel, TOBB-ETÜ
  Topic: Precoder Design for Downlink Multiuser MIMO Systems

- 26 April 2019
  Speaker: Dr. Ali Bayramoglu
  Topic: Psychology

- 3 May 2019
  Speaker: Assoc. Prof. Uluç Saranlı, Middle East Technical University
  Topic: Model-Based, Reactive Control of Legged Locomotion on Rough Terrain

- 10 May 2019
  Speaker: Dr. Derya Malak, Massachusetts Institute of Technology and Northeastern University
  Topic: Coordinating Caching and Computation in Networks

- 17 May 2019
  Speaker: Prof. F. Ömer Ilday, Bilkent University
  Topic: Ultrafast Laser-Driven Self-Organized Nano- and Micro-Structuring

More information (photographs, YouTube links, etc.) on the past events, as well as the program for the upcoming activities may be found on the Chapter website: http://aeme.ieee.metu.edu.tr

Waterloo, Canada

On August 8, 2019, the IEEE Kitchener-Waterloo Section EMC/MAG Joint Chapter organized a half-day technical event together with Nemko Canada. The first session was presented by Jandrew Gonzales from Nemko Canada on "Regulatory Compliance, NRTL/C Schemes, EMC/EMI and Wireless Radio Certifications" which was targeted for electronic device manufacturers, IoT and wireless communication companies. Jandrew has been in the testing, inspection and certification industry for over four years, with three years as an EMC test engineer.

The second session was presented by Dieter Paasche, Senior Product Developer from Christie Digital, on "EMC Basics" which focused on EMC standards including radiated emission/immunity, conducted emission/immunity, ESD, surge, EFT, Magnetic Field Immunity, Voltage Dips and Short Interruptions. Dieter has 25 years of experience in EMC and he was in charge of EMC Precertification Lab at Christie Digital.

The third session was presented by IEEE EMC Society Distinguished Lecturer, Dr. Xiaoxiong (Kevin) Gu, on "Opportunities, Challenges and Implementations of Silicon Integration and Packaging in mmWave Radar and Communication Applications". During the session, Dr. Gu provided the background of the

The EMC Kitchener-Waterloo Chapter hosted a half-day technical event at Nemko Canada with over 30 attendees on August 8.

Jandrew Gonzales from Nemko Canada presented "Regulatory Compliance, NRTL/C Schemes, EMC/EMI and Wireless Radio Certifications" during the Kitchener-Waterloo Chapter technical event.

Dieter Paasche from Christie Digital presented "EMC Basics" during the Kitchener-Waterloo Chapter technical event.

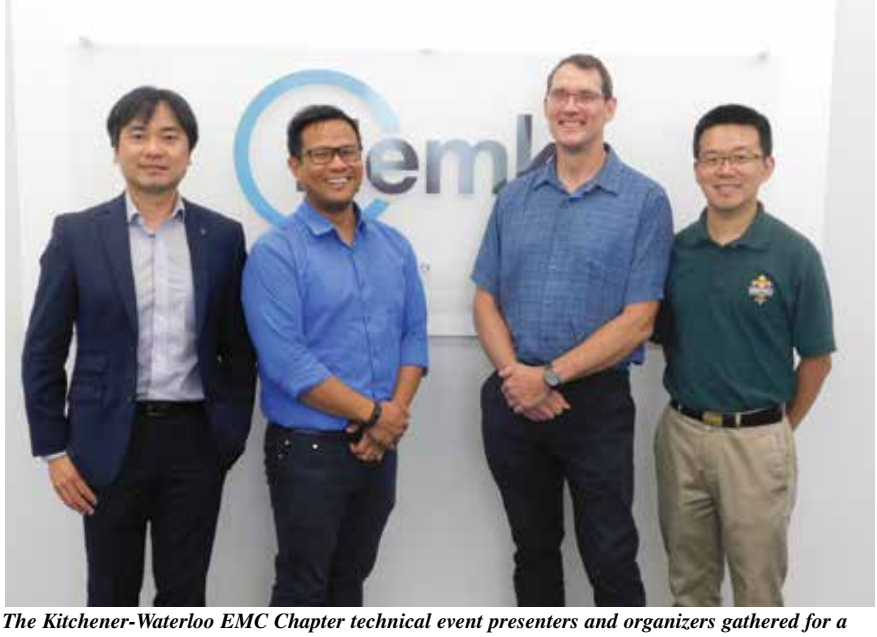
IEEE EMC Society Distinguished Lecturer, Dr. Xiaoxiong (Kevin) Gu of IBM, presented "Opportunities, Challenges and Implementations of Silicon Integration and Packaging in mmWave Radar and Communication Applications" during the Kitchener-Waterloo Chapter technical event

Jandrew Gonzales (far right) of Nemko Canada provided a facility tour, including a stop in their 3-meter semi-anechoic EMC chamber.

The facility tour also included a stop at the Nemko Canada Immunity Testing Section.

research work of mmWave Subsystems at IBM Research Center. He then explained a 28 GHz phased-array antenna module in detail. The animation of beam steering and gain control were eye-catching. The software defined phased array at 28 GHz video was also very interactive. Lastly, Kevin also briefly showed some 60 GHz and 94 GHz research work at IBM. Lots of interactive questions and answers were exchanged throughout the session.

The final session was the Nemko lab tour for their certification lab capability, which included a close view of a 3m semi-anechoic EMC Chamber, a wireless radio certification setup capable of FCC/ISED/CE radio tests and an immunity testing section for CE and International requirements.



The Kitchener-Waterloo EMC Chapter technical event presenters and organizers gathered for a group photo at the end of a successful day. From left are Xiaoxiong (Kevin) Gu, Jandrew Gonzales, Dieter Paasche, and Mingchang Wang (Chapter Vice-Chair) with Christie Digital.

The half-day event was well attended by more than 30 professionals and scholars from industry and universities. A BIG thank you to Nemko Canada who sponsored this technical event at their facility. **EMC**